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(54) An insert for fixing a cladding panel

(57) An insert for fixing a panel (7) made of a stone material or the like, for the cladding of an external face of a building. The insert is housed in a respective seat (8) formed on panel (7) and it comprises a body (1) having a substantially symmetrical shape with respect to an axis, a circumferential abutment lip (3) extending from the lateral surface thereof, and a tubular member (4) which coaxially covers body (1) abutting against lip (3). A circumferential groove (9) is provided in seat (8) whereby, when the insert is housed in seat (8), tubular member (4) is deformable, by way of an axial push against lip (3), generating a circumferential protrusion (13) which expands into groove (9) for anchoring the insert into seat (8). Means (2) for engaging panel (7) to the building face are also provided on body (1).

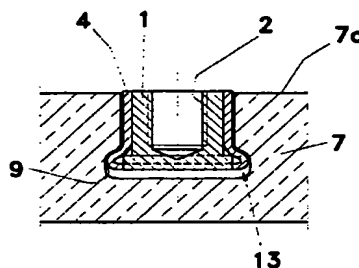


Fig.6

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Description

[0001] The present invention relates to the field of ventilated stone claddings for external faces of buildings, and in particular it refers to a fixing insert for a cladding panel.

[0002] For the cladding of external faces of buildings with panels made of stone or the like, the so called ventilated system is meeting a more and more widespread application. According to this system, the cladding panels are mechanically fixed to the wall, without interposing the conventional mortar filling, thereby an air space is formed to prevent the moisture and heat from being transmitted from the outside to the inside of the building. In this way the stone cladding is also able to take up without any damages the plastic and elastic strains of the structure, namely caused by settling and thermal expansions.

[0003] It will be apparent from the foregoing that it is of the utmost importance that the mechanical fixing of the panels to the structure to be clad should be structurally safe on the basis of the reference regulations and that it should be carried out with the use of systems which allow the fulfilment of the solutions required by architectural choices, in connection with the different supporting structures. These systems must also be cheap and allow a convenient and fast laying.

[0004] For the above purpose, inserts of different shapes are now used, to be anchored in seats suitably formed in the panel and provided with engagement means for the connection of the panel itself to the supporting structure. Known inserts don't comply satisfactorily with the above cited requirements. Namely, some of them involve very high costs, both since they can't be made by way of simple machining, and because the process for their anchoring to the panel is difficult, requiring the execution of complex-shape notches on the panel and the use of expensive specific tools.

[0005] Other kinds of inserts are on the whole cheap but they have a very low loading capacity, which in many cases is not sufficient to assure the required safety. Finally, further ones provide engagement means having the shape of elements which protrude from the panel face, e.g. threaded bolts. In order to avoid troubles in the handling, the storage and the transport of the panels, the inserts have to be applied in the building yard rather than straightway in the workroom. This fact causes considerable difficulties, in particular for what concerns the check of the precision and the reliability of the anchoring between the insert and the panel and so of the overall quality of the fixing.

[0006] It is an object of the present invention to provide a fixing insert of the above mentioned kind, which doesn't have any of the above cited drawbacks, and which in particular is able to assure a very high loading capacity even with a compact and economical structure.

[0007] This object has been achieved with the insert for fixing cladding panels according to the present

invention, as defined in the characterising part of claim 1.

[0008] For a fuller appreciation of the features and advantages afforded by the fixing insert according to the present invention, a preferred embodiment will now be described by way purely of example and implying no limitation, with reference to the accompanying drawings, in which:

- Figure 1 shows an axial sectioned, exploded view of an insert according to the invention;
- Figure 2 illustrates a panel which has to be fixed by way of the insert of figure 1;
- Figure 3 shows an axial sectioned view, taken along line III-III of figure 2, of a seat in which the insert according to the invention is anchored;
- Figures 4 to 6 show three successive steps of the process for anchoring the insert of figure 1 to the panel of figure 2.

[0009] With reference in particular to figure 1, a fixing insert according to the invention comprises a body 1 generically symmetrical with respect to an axis, and namely cylindrical, on a base face 1a of which a threaded seat 2 is axially formed. A circumferential abutment lip 3 extends from the lateral surface 1c of body 1, in correspondence to the edge which is close to the other base face 1b. The insert also comprises a tubular member 4, the inside diameter thereof being hardly larger than the diameter of body 1; in this way member 4 can be placed outside body 1, covering the lateral surface 1c thereof and abutting with its end 4a against lip 3.

[0010] Near its end 4a, tubular member 4 has an axial length 5 having a reduced wall thickness for the provision of an internal circumferential groove 6, the function of which will be made clear hereinafter. The longitudinal development of tubular member 4 is larger than that of body 1, thereby when they are coaxially coupled, as above described, the other end 4b of member 4, i.e. that which is placed at the opposite side with respect to lip 3, axially extends from base face 1a of body 1.

[0011] With reference now in particular to figures 2 and 3, for the fixing of a cladding panel 7 to a structure, not shown, using the insert according to the invention, cylindrical seats 8 have to be formed in the rear face 7a of the panel, each seat being able to house an insert and having a depth which is substantially equal to the axial development of body 1. Namely, as in the depicted example, four seats can be provided, each formed in correspondence of a respective corner of the panel. Each seat 8 provides a circumferential groove 9, which can be made using suitably shaped milling cutters.

[0012] In figures from 4 to 6 there is shown the process for placing and then anchoring the insert according to the invention in the respective seat 8. The use of an insert-drawer tool, schematically shown in the figures, is required. It has a threaded punch 11 which is screwed

into seat 2, after that body 1 and tubular member 4 have been coaxially coupled, and a shoulder 12, axially movable with respect to punch 11, which is pushed to abut against end 4b of tubular member 4.

[0013] The insert is then placed inside the respective seat 8, until base face 1b of body 1 gets in contact with, or near to, the bottom of the seat. At this point, as shown in figure 5, by exerting an axial pulling on punch 11, body 1 is axially drawn towards the outside of seat 8, while a simultaneous push of shoulder 12 in the opposite direction axially presses tubular member 4 between the shoulder itself and lip 3 of body 1. The compression load generated in this way plastically deforms member 4 in correspondence to its reduced thickness length 5, and in this way member 4 expands around lip 3, engaging with it, into groove 9. An annular protrusion 13, of substantially toroidal shape, is then formed as shown in figure 6, in which the insert-drawer tool has already been removed.

[0014] The abutment of protrusion 13 against groove 9 prevents the axial displacement of the insert, which is then firmly anchored to panel 7, tubular member 4 being completely housed in the respective seat 8 and so not extending from rear face 7a of the panel. Axial seat 2, which opens in a substantially coplanar way with respect to face 7a, is so engageable for the fixing of the panel with conventional threaded elements extending from the structure to be clad.

[0015] The use of the insert according to the invention offers many important advantages if compared with known fixing means. Above all the wide and regular abutment surface between the insert and groove 9 of seat 8 allows the transfer of high loads with low contact pressures, this with an extremely small overall size which permits the application of the insert in very thin panels. The insert can be applied and checked straightway in the workroom during the operations of treatment and finishing of the panel, since no elements protrude from rear face 7a of panel 7, which can be afterwards packed and transported in a conventional way, the presence of the inserts never causing any troubles.

[0016] The insert can be manufactured at a very low cost for its simplicity. It can be quickly applied, with the aid of a simple and cheap tool and according to a process which can be easily automated. Furthermore, the process doesn't imply the transfer of any stresses to the material of the panel, for the deformation of tubular member 4 is carried out by way of forces which are exchanged between the latter and body 1 and so internal to the insert. Even if in the depicted example protrusion 13 takes shape in correspondence to lip 3, if groove 6 is formed in an axially different position it will take shape in a consequently displaced position.

[0017] The insert can possibly be applied also in different positions from the rear side of a panel. If specific requirements make it necessary, a protruding element, e.g. a threaded bolt, can in any case be provided instead of seat 2. Obviously, in this case the use of a

slightly different insert-drawer tool, with respect to that described above, will be required. Besides, synthetic-based glues can be employed when the anchoring has to be made even safer, in this way the overall loading capacity of the fixing being enhanced.

[0018] The insert according to the invention can be also used for the cladding of internal walls, for fixing panels made of natural or composite stone, of terracotta, ceramic, asbestos lumber, or of any other material which is suitable for this kind of employ.

[0019] The insert for fixing cladding panels according to the present invention can be modified and/or adapted to suit individual applications, without prejudice to the scope of protection afforded under the appended claims.

Claims

1. An insert for fixing a panel (7) made of a stone material or the like, for the cladding of an external face of a building, said insert being houseable in a respective seat (8) formed on said panel (7) and being characterised in that it comprises a body (1) having a substantially symmetrical shape with respect to an axis, a circumferential abutment lip (3) extending from the lateral surface thereof, and a tubular member (4) for coaxially covering said body (1) abutting against said lip (3), a circumferential groove (9) being provided in said seat (8) whereby, when said insert is housed in said seat (8), said tubular member (4) is deformable, by way of an axial push against said lip (3), generating a circumferential protrusion (13) which expands into said groove (9) for anchoring said insert into said seat (8), means (2) for engaging said panel (7) to said building face being provided on said body (1).
2. The insert according to claim 1, wherein a circumferential groove (6) is formed on the inside of said tubular member (4), for creating an axial length (5) having a reduced wall thickness to make the deformation of member (4) easier.
3. The insert according to the previous claims, wherein said circumferential groove (6) is formed near the end of said tubular member (4) which has to abut against said lip (3).
4. The insert according to the previous claims, wherein said means for engaging said panel (7) comprise a threaded seat (2) axially formed in said body (1).
5. A method for anchoring a fixing insert to a panel (7) for the cladding of an external face of a building, characterised in that it comprises the following steps:

- forming a seat (8) on said panel (7) to house said insert, said seat (8) having a circumferential groove (9);
- housing said insert into said seat (8), said insert comprising a body (1) having a substantially symmetrical shape with respect to an axis, a circumferential abutment lip (3) extending from the lateral surface thereof, and a tubular member (4) for coaxially covering said body (1) abutting against said lip (3), said tubular member (4) having an axial length (5) with a reduced wall thickness;
- exerting an axial pulling, by way of a suitable tool, on said body (1) towards the outside of said seat (9), and simultaneously a push on said tubular member (4) in the opposite direction, i.e. against said lip (3), whereby said tubular member (4) is plastically deformed in correspondence to said axial length (5) of reduced wall thickness, creating a circumferential protrusion (13), of a substantially toroidal shape, which expands into said groove (9) for anchoring said insert.

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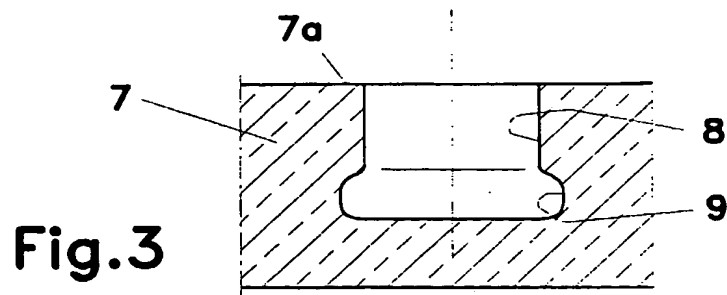
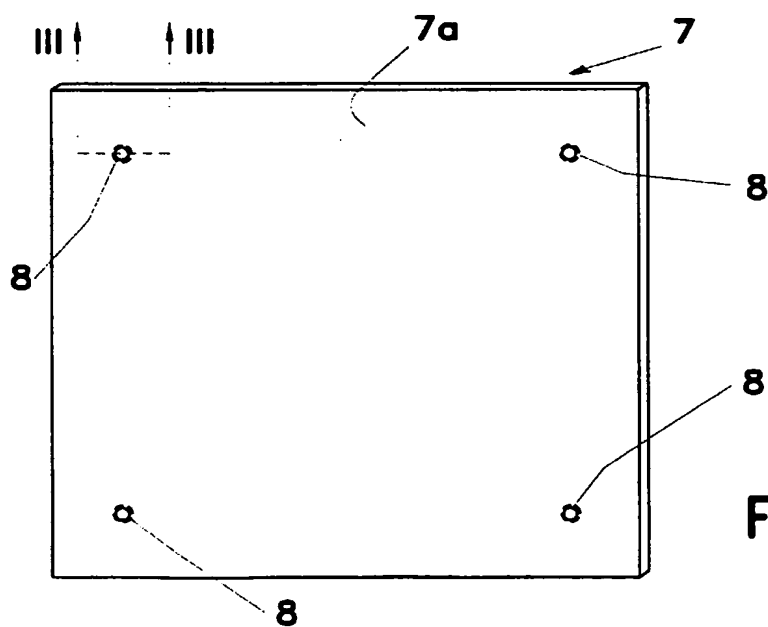
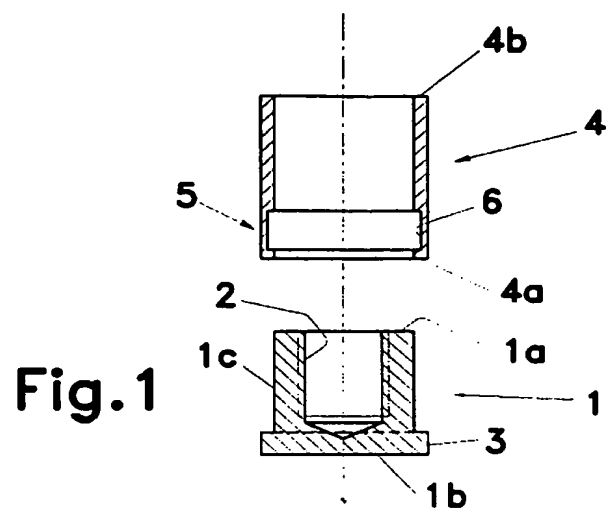
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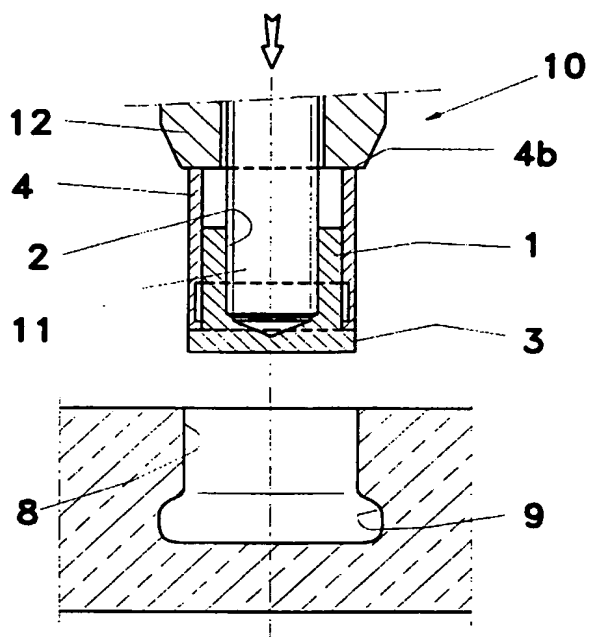


Fig. 4

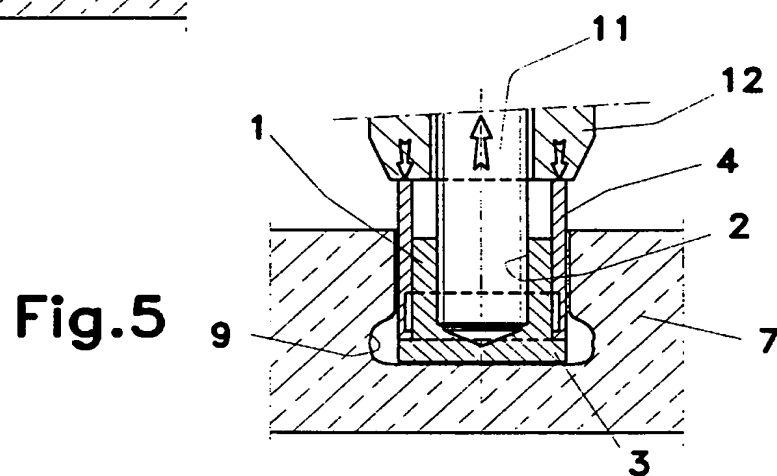


Fig. 5

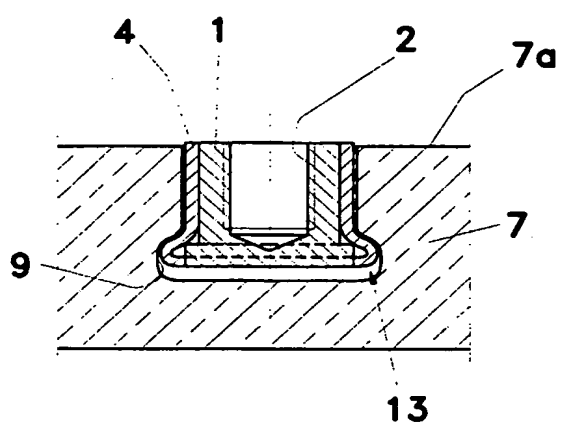


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0025

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE 34 42 060 A (DOGANOFF ILIJA DR ING) 28 May 1986 * abstract * * claims 1,2 * -----	1,5	F16B1/00 E04F13/08 E04G23/02
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E04F E04G
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 23 June 1998	Examiner Schaeffler, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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